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Impact of HR Practices on HR Efficiency with A Mediating Effect of Artificial Intelligence: A Study of the IT Sector of Pakistan

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ABSTRACT

This research investigates the effects of the human resource (HR) practices within the organization on the efficiency of the HR process, with emphasis on the mediating role of the artificial intelligence (AI) applications in human resource management (HRM). In the context of rapid digital transformation, HR functions are increasingly experiencing a transformation from traditional administration functions to technology-driven systems that are strategically driven. Drawing on data collected from employees who are working in IT and technology driven organisations in Pakistan, the study examines the impact of core HR practices, namely recruitment and selection, performance appraisal and training and development, on the adoption of AI applications and in turn improve the efficiency of the HR process. A quantitative and explanatory research design was used, and data were analysed by Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings show that well-structured HR practices are a significant predictor of adoption of AI applications in HRM, and the adoption of AI has a strong positive effect on the efficiency of the HR processes in terms of speed, accuracy, and reduction in manual workload. Moreover, the results do confirm AI applications significantly mediate the relationship between HR practices and HR process efficiency, indicating that the efficiency gains from HR practices is substantially amplified by support from AI-enabled systems. This study adds to the growing number of studies in the literature on digital HRM by empirically integrating traditional HR practices with emerging AI technologies and offers valuable findings for managers who are interested in improving the HR efficiency by strategic alignment of HR systems and intelligent technologies.

Keywords:

Human Resource Practices; Artificial Intelligence in HRM; HR Process Efficiency; Digital Transformation.

CHAPTER 1: INTRODUCTION

1.1. Background of the Study:

Global organizations are experiencing a major digital revolution that is transforming human resource functions in the way these functions are done (Pan and Froese, 2022; Vrontis et al., 2022). Human Resource Management (HRM) is no longer characterized by administrative functions, but it relates to a strategic decision-making process that directly correlates the performance of the organization and its competitive edge (Meijerink, Bondarouk, and Lepak, 2021). Traditionally, the fundamental HR functions of recruitment and selection, performance appraisal, and training and development are listed among the most important factors that define the effectiveness of the workforce, the performance of employees, and the performance of the organization (Dang, 2025; Jebbari, 2023). The practices form the foundation of human capital management due to their role in ensuring that the appropriate talent is recruited, constantly developed, and evaluated in a fair manner (Nawaz et al., 2024).

Alongside these existing HR practices, the recent trend of growing Artificial Intelligence (AI)-based technologies is changing the way HR functions through automating routine activities, deciding better, and making predictive analytics (Basu et al., 2023; Zhai, Sun, and Han, 2024). Recruitment AI tools are used more frequently to screen and match applicants and reduce bias to enhance speed and accuracy (Van Esch, Black, and Ferolie, 2019; Pan, Guan, and Wu, 2022). Likewise, AI also boosts performance appraisal by providing objective analytics, which allow delivering more frequent and real-time feedback that increases employee engagement and performance (Chowdhury et al., 2023). Machine learning algorithms in training and development can offer personalized learning strategies and adaptive programs of skill development, which promote ongoing performance improvement (Nawaz et al., 2024).

Although there is a fast rate of technology uptake, the relationship between the traditional HR services and use of AI has remained under-researched in empirical studies, particularly with respect to the combined impact on efficiency of the HR processes (Pereira et al., 2021). Although it is established that HR practices can shape the performance of organizations and employee performance, and AI has been shown as potentially able to streamline HR practices, there is limited information on how such forces can come together to form significant changes in the efficiency of

HR processes (Salem, 2024; Suseno et al., 2021). This research will fill this gap by focusing not only on the direct correlation between HR practices and AI adoption, and between AI adoption and HR efficiency, but also on whether AI applications can mediate the correlation between HR practices and HR process efficiency. The study can aid in the theoretical progress through the incorporation of HRM and technology adoption knowledge, and the analysis of the research can be used by HR executives who want to realize the value of AI applications.

1.2. Problem Statement

Despite the growing investment in AI technologies by organizations on the assumption that digital tools will improve the effectiveness of HR, the data on the contribution of AI to better HR processes and the interaction between this contribution and the practices already in place are still inconsistent. Other literature has been analyzing HR practices as the sole study or the acceptance of AI but has not combined the two streams into a coherent framework (Meijerink et al., 2021; Pereira et al., 2021). As an example, the studies of recruitment and selection typically focus on HR strategic results and overlook the way AI technologies can enhance or compromise such results (Dang, 2025). On the same note, studies on AI adoption have described the functionality and capabilities of AI tools without satisfactorily connecting them to core HR practices and organizational measures of efficiency (Basu et al., 2023; Zhai et al., 2024). Such fragmentation leaves practitioners in HR in a state of practical uncertainty: on one hand, AI is being promoted as a performance enhancer; on the other hand, there is a lack of knowledge on how it will respond with the conventional HR functions to deliver efficiencies that can be measured. Therefore, there is a pressing necessity for research that would compare the practices and strategies of HR against the adoption of AI in order to identify the combination of their impacts and their outcomes as far as HR processes are concerned, providing the evidence-based information to both scholars and practitioners.

1.3. Research Gap

Although the literature on HR practices and AI in HRM is sufficient, there are still several gaps. Dual Focus on HR Practices and AI Adoption: The majority of the existing papers have explored HR practices (recruitment, appraisal, and training) without examining how they are

related to the new AI applications in HRM (Dang, 2025; Jebbari, 2023). On the other hand, AI studies usually imply analyzing the capabilities of technologies and the issues of their implementation without referring to core HR functions (Basu et al., 2023; Pan and Froese, 2022). This division restricts our knowledge about the synergistic opportunities of HR practices and AI adoption.

Although it is common wisdom that AI technologies positively influence HR results, there is limited evidence on the issue of whether AI mediates the relationship between HR practices and HR process efficiency. Limited empirical research has been conducted to test this mediation effect, and hence there exists a theoretical gap of knowing AI as a process through which HR practices are converted to efficiency gains (Meijerink et al., 2021; Pereira et al., 2021).

Current studies tend to use one area or field of research, which limits the applicability of the results (Hosain, 2017; El Fawal et al., 2024). The cross-industrial evidence of the effect of AI on HR practices and HR process effectiveness is limited, especially in emerging markets.

Even though AI is said to increase efficiency, research rarely exercises the operationalization and measurement of HR process efficiency in systematic fashions to match HR practice outcomes (Liu et al., 2026; Nawaz et al., 2024). The actual performance impact is difficult to measure without regular efficiency indication. The gaps will be addressed not only to perfect the theoretical models but also to give a practical indication of how to incorporate AI in the HR practices and improve performance.

1.4. Research Objectives

This study aims to achieve the following detailed objectives:

1. To examine the relationship between core HR practices recruitment and selection, performance appraisal, and training and development and the adoption of AI applications in HRM.
2. To investigate the impact of AI applications on HR process efficiency by measuring changes in process speed, accuracy, and quality following AI adoption in HR functions.

3. To analyze the direct influence of traditional HR practices on HR process efficiency irrespective of technological interventions.
4. To evaluate the mediating role of AI technologies between HR practices and HR process efficiency.

1.5. Research Questions

Based on the literature and research objectives, the study will explore the following questions:

1. What is the nature of the relationship between HR practices (recruitment, performance appraisal, training and development) and the adoption of AI applications in HRM?
2. How do AI applications in HRM influence HR process efficiency?
3. To what degree do traditional HR practices directly affect HR process efficiency without the intervention of AI technologies?
4. Does the implementation of AI applications significantly mediate the relationship between HR practices and HR process efficiency?

CHAPTER 2: LITERATURE REVIEW

2.1. Organizational HR Practices

The essence of strategic Human Resource Management (HRM) is based on the organizational HR practices namely recruitment and selection, performance appraisal, as well as training and development. It is not new that body of classical HRM research affirmed that the practice of effective recruitment directly affects organizational performance by making sure that the appropriate talent is drawn and recruited to work in the areas that create competitive advantage (Huselid, 1995; Becker et al., 2001). These practices are also applied to performance appraisal systems that measure the contribution of the employees and aligning the individual results with the strategic objectives. Conventionally, performance appraisal has been defined as systematic feedback and performance ratings that are aimed at guiding promotion, compensation and development decisions. Similarly, training and development activities can be utilized to increase the competencies of employees, maintain workplace flexibility, and aid in the career development of these individuals (Jebbari, 2023; Dang, 2025).

Current works in the field of organization restate that foundational HR practices are still the key to organizational success despite the impact of digital transformation (Rasheed et al., 2025). Researchers identify that HR practices are still relevant in the effects on employee attitudes and performance outcomes through the influence of organizational culture, commitment and job satisfaction. As an illustration, competent recruitment will match the competencies of the candidate with the requirements of the organization minimizing turnover and increasing organizational fit. When viewed as being just and so open, performance appraisal systems reinforce motivation and accountability. Individual and organizational learning capabilities are also achieved through the training and development practices in order to accommodate the changes in technology and the changing job requirements of the employees (Rasheed et al., 2025).

Although the significance of the HR practices has been acknowledged, the traditional literature usually considers these practices as an isolated category with little regard to integration when discussing the digital augmentation, which is a weakness that modern research has yet to mitigate by means of integrating the technology adoption frameworks with the practices.

2.2. AI Applications in HRM

The introduction of Artificial Intelligence (AI) has made a strong impact on the practices of human resources due to the automation of routine tasks and improved accuracy in decision-making and predictive insights, which were previously unattainable (El-Ghoul, 2024; Venugopal, 2024). The use of AI in the HR functions, such as recruitment, performance management, and training, has progressively become more widespread and resulted in significant alterations in the operations and strategic performance.

AI is employed in the recruitment and selection area to search through vast pools of candidates, compare their profiles with the job description and perform preliminary screening of candidates via algorithmic decision models (El-Ghoul, 2024; Alsaif, 2023). They are technologies that tend to utilize machine learning and natural language processing to save time to hire, make the process more objective, and save the administrative work of HR professionals (El-Ghoul, 2024). Predictive analytics is also aided by AI which forecasts the success of candidates and their cultural fit; thereby improving the quality of recruitment.

During the performance appraisal, the AI systems are capable of assisting with constant monitoring and analysis of data related to employee performance and providing real-time data, which can be used to help evaluate the performance of the employees more objectively. Artificially intelligent performance indicators decrease the use of manual scorecards and give dynamic performance feedback that is especially desirable in a rapidly changing workplace (El-Ghoul, 2024). Equally, the AI-based training platforms tailor the educational experience of employees by suggesting specific courses, tracking performance, and predicting skills gaps using performance data and, thus, improving the relevance and effectiveness of training programs (Ahmad et al., 2022; Rasheed et al., 2025).

Nevertheless, researchers observe that there are some obstacles to the implementation of AI. The AI-based HR systems are often characterized by ethical issues related to bias, data privacy, and transparency, and need the governance mechanisms and human oversight to be maintained to uphold a sense of fairness and keep employees trusting the system (El-Ghoul, 2024; Rasheed et al., 2025). This highlights the need to have balanced technological implementation that does not supersede human judgment.

2.3. HR Process Efficiency

Efficiency in the HR processes is defined as how the HR functions generate the desired output with minimal wastage of time, money, and effort. The measures of efficiency include faster workflow, shorter cycle time on HR processes, higher data quality, and an increased match of HR outputs with organizational objectives. As AI gains importance in use, researchers note that one of the most visible organizational advantages of technology adoption in HRM is efficiency (Murugesan, 2023; Rasheed et al., 2025).

Research has shown that using AI is highly associated with the efficiency of HR processes, as it eliminates routine operations like resume screening and interview scheduling and allows HR professionals to concentrate on strategic activities (Murugesan, 2023). Analytics based on AI make it easier to perform performance evaluation through the aggregation of big data and providing meaningful insights in the shortest possible time, which enhances both reliability and timeliness in performance feedback. Likewise, the effectiveness of training is also increased by means of adaptive learning platforms, which tailor the content delivery to the needs of personal learning habits and skills.

Recent quantitative research confirms that there exists a positive relationship between AI-based HR practices and efficiency measures of an organization. As an example, Kurup (2025) discovered that there was a strong positive relationship between the use of AI in HR functions and the efficiency of HR processes overall ($r = 0.68$, $p < .01$), and organizations that used AI technologies were also characterized by faster HR processes and better operational performance (Kurup, 2025). The findings are in line with the wider current research tendencies that suggest AI automation not only but also allows smarter use of resources and informed decisions.

Nevertheless, researchers underscore that contextual factors, including organizational preparedness, acceptance of the AI by the employees, quality of data, and integration between the AI and the existing systems determine the efficiency gains (Rasheed et al., 2025). This leads to the significance of strategic planning and capacity building in the implementation of AI in HRM.

2.4. Interplay between HR Practices, AI Applications, and HR Process Efficiency

Another theme that has been picked up critically in the literature is the dynamic interplay that exists between traditional HR practices and AI technologies in the processes of determining the efficiency of HR processes. Although the relationship between foundational HR practices and increased organizational performance has always been established, recent studies indicate the possibility of enhancing the efficiency of these practices by AI to be able to make them faster, objective, and more flexible.

The conceptual reviews suggest that AI does not exist independently and instead if it exists in interaction with HR practices, it changes how HR functions are performed (Thakur, 2025; Murugesan, 2023). As an example, AI augmentation of recruitment and selection can provide a more accurate match of the candidates and decrease human bias, and the HR practices will be more efficient and effective. Equally, performance management based on the use of AI expands the features of the old-fashioned appraisal systems by offering self-corrective feedback loops and data-based reviews.

The mediating role of AI between HR practices and HR process efficiency is increasingly emphasized in recent conceptual frameworks. Thakur (2025) describes a concept where the implementation of AI in HR functions serves as a channel whereby recruitment, appraisal, and training practices are converted into efficiency benefits. The AI does not only help to speed up the HR functions but also aids the strategic performance goals of the organization, including improved talent fit and improved employee engagement (Thakur, 2025). This implies that HR practices are still important, but their contributions to efficiency can be enhanced considerably with the help of AI-based mechanisms.

2.5. Theoretical Framework

2.5.1. Key Variables and Model

Independent Variables (IVs):

The core HR practices include recruitment and selection, training and development, and performance appraisal. These represent the formal actions an organization takes to manage its workforce.

Mediating Variable (MV):

Artificial Intelligence Applications in HRM. AI is expected to influence how effectively HR practices are implemented and how they translate into efficient outcomes. Rather than being a standalone solution, AI acts as a bridge between HR practices and results.

Dependent Variable (DV):

HR Process Efficiency refers to the organization's ability to achieve HR objectives with minimal resources, better process speed, improved accuracy, and enhanced employee experience.

This relationship can be shown as in the Conceptual Framework:

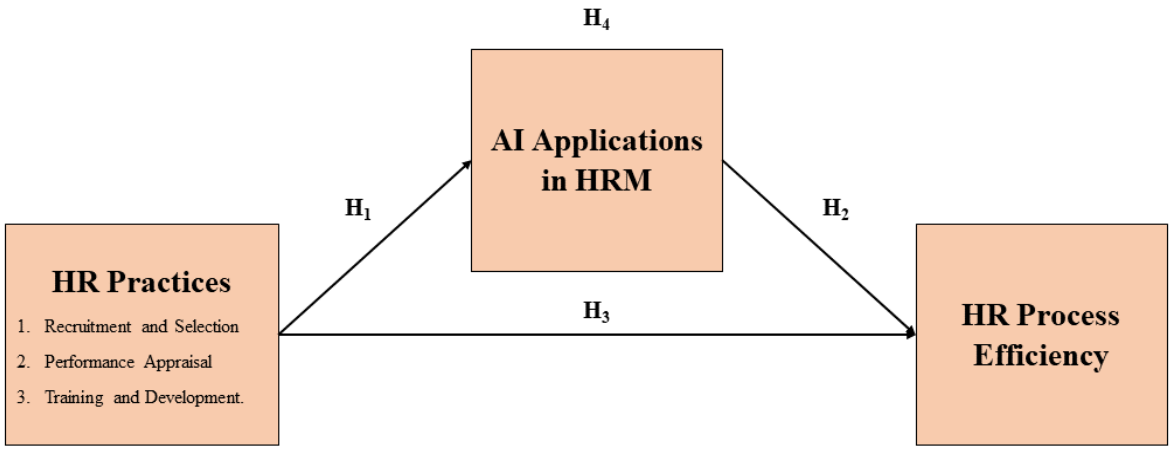

Figure-1 Conceptual Framework

2.6. Research Hypotheses

The following hypotheses have been developed conforming to the research objectives and the theoretical framework. Each hypothesis evaluates the impact of HR practices on HR efficiency, with AI as a mediating factor.

H1: There is a significant positive relationship between organizational HR Practices (Recruitment and Selection, Performance Appraisal, and Training and Development) and the adoption of AI Applications in HRM.

H2: The implementation of AI Applications in HRM has a significant positive impact on HR Process Efficiency.

H3: HR Practices (Recruitment, Appraisal, and Training) directly and significantly influence HR Process Efficiency.

H4: AI Applications in HRM significantly mediate the relationship between HR Practices and HR Process Efficiency.

2.7. Literature to Support Hypothesis

2.7.1. Organizational HR Practices and AI Applications in HRM

The integration of Artificial Intelligence (AI) into HRM has become an increasingly discussed topic in the contemporary human resources literature, with literature finding the practice of core HR functions and the integration of AI technologies to have strong linkages. Organizational HR practices such as recruitment and selection, performance appraisal, and training and development have traditionally been considered strategic parts of human capital management practices, and recent researches indicate that these HR practices affect the degree to which organizations use AI applications in HRM to improve efficiency and effectiveness in these areas (Ubeda-Garcia et al., 2025). For example, research has shown that some of the factors in the usage of AI in recruitment are a need to efficiently process high applicant volumes, automate candidate screening, and enhance fit between job requirements and applicant competencies, all of which arise from changing recruitment and selection practices (Nawaz et al., 2024; Singh, 2025). This positive

relationship emphasizes the fact that organizations that are dedicated to evolving their HR practices are also more likely to adopt AI solutions that can support these practices.

The acceptance of AI in performance appraisal is another example of this relationship. State-of-the-art AI functionality allows real-time performance monitoring, objective evaluation metrics, predictive understanding creation, and a constant responding framework, which resonates perfectly with contemporary performance management techniques focusing on enhancing employee appraisal (Alsmuhanna, 2025; El-Ghoul, 2024). By incorporating AI into the performance management systems, the organizations are not only supplementing the traditional performance appraisal systems but are also indicating their increased technological sophistication to adopt further use of AI technologies in other HR related functions. This synergistic connection would imply that performance appraisal practices serve as drivers for AI adoption, enabling more comprehensive and data-driven human resource strategies.

Similarly, training and development practices are linked to the adoption of AI in HRM to an increasing extent. AI-driven programs are also changing traditional training programs by individualizing the learning process, identifying skill deficits more precisely, and prescribing specific development interventions (Ubeda-Garcia et al., 2025; Rasheed et al., 2025). Research has shown that the organizations that have highly organized and active training and development practices tend to be more likely to adopt AI applications that enable adaptive learning and ongoing skill development, which supports the argument that highly developed HR practices are likely to predict AI adoption. For instance, systematic reviews of literature indicate AI's importance in providing customized development opportunities based on employee performance data, illustrating the adoption of AI through the changing practices of training (Rasheed et al., 2025).

There is also empirical evidence for these theoretical linkages. Research conducted among HR professionals in the organizational context shows that the higher the level of AI knowledge and use, the better individuals perceive and implement AI in recruitment, performance appraisal and training scenarios (Jatoba et al., 2023; Ncube, 2025). In particular, it was revealed that the more the HR managers are acquainted with AI, the more most of them adopt AI-enabled systems in recruitment and performance evaluation, which indicates a positive correlation between the current HR practices and willingness to implement AI technologies (Jatoba et al., 2023).

In addition, wider systematic analyses and bibliometric studies emphasize the fact that organizations with more mature functions in HRM, specifically in recruitment, performance, and training, are more likely to utilize comprehensive AI solutions in HRM to upgrade their strategic outcomes (Ubeda-Garcia et al., 2025; Rasheed et al., 2025). These studies cast AI adoption not as a mere technological trend but rather as an organizational response to the changing needs of HR practice, which implies a mutualistic relationship between advanced HR practices and the adoption of AI innovations.

In sum, the literature is consistent on supporting the idea that strong organizational HR practices have positive effects on the adoption of AI applications in HRM. Organizations with investments in modern recruitment, strong performance appraisal, and sophisticated training and development systems are then likely to invest in AI tools that boost efficiency, decision-making, and effectiveness within HR functions, giving empirical and conceptual support for Hypothesis 1.

H1: *There is a significant positive relationship between organizational HR Practices (Recruitment and Selection, Performance Appraisal, and Training and Development) and the adoption of AI Applications in HRM.*

2.7.2. AI Applications in HRM and HR Process Efficiency

The emergence of Artificial Intelligence (AI) in the Human Resource Management (HRM) has been shown to have numerous beneficial impacts on HR processes, with several scholarly studies suggesting that the use of AI in HRM leads to markedly higher efficiency rates in the processes through automation of routine tasks, enhanced decision-making processes, and cost-reduced operations. The use of AI has been demonstrated to automate HR operations like hiring, human resource management, staff planning, and training, therefore, changing the way HR work is performed and allowing organizations to record enhanced efficiency results (Murugesan, 2023). In the hiring process, artificial intelligence tools can save time and effort by filtering through many applications in seconds, automating resume screening and candidate matching, reducing hiring processes, and improving resource management in the HR department (Murugesan, 2023; Alsaif, 2023). Such automations do not only ease the workload of people but also increase the overall efficiency and speed of the recruitment processes, which can be seen as showing a strong positive relationship between the adoption of AI and the efficiency of HR operation.

Within performance management, AI applications are actively utilized to create real-time data on the performance of employees, allowing HR managers to track the trends in productivity and deliver data-driven feedback more effectively as compared to the previous annual review systems (Alsaif, 2023; Mehta, 2025). Studies indicate that performance analytics tools with AI capabilities will enhance the performance appraisal process through more efficient use of large data to create actionable insights due to the lack of subjectivity, the ability to monitor continuously, and the reduction of bias (Alsaif, 2023; Thakur, 2025). These features assist in streamlining the evaluation process by organisations to ensure more strategic HR results, as well as less administrative overhead, contributing significantly to the efficiency of HR processes.

Another way of how AI applications help improve efficiency in the training and development area is by customizing the learning programs to specific employee requirements and promoting accessibility within the adaptive learning environment. Research reveals that AI-related training systems have the potential to enhance the flexibility and effectiveness of training and can save training time that is wasted on standard training courses, enhancing the interest of learners and their acquisition of skills (Alshahrani et al., 2025). The automation of the delivery of personalized content can guide the efficient process of utilizing training resources and promote better results in comparison with the traditional one-size-fits-all models.

Wider literature reviews and systematic investigations indicate that AI is associated with an increase of HR productivity and process effectiveness in various areas of HR. To illustrate, systematic reviews have revealed that institutions that have applied AI to HR functions have streamlined work processes and improved decision-making, leading to lower process cycle times and quality services in HR operations (Witara, 2025; Udanoia, 2024). According to these studies, AI technologies do not only automate transactional work but also help HR professionals to devote more time to strategic work, which increases the overall efficiency of the HR processes.

These are further conceptual findings that are supported by empirical evidence. The studies of HR practitioners show that the implementation of AI enhances the productivity of the HR functions and especially on the activities of recruitment and performance management by relieving the HR professionals of routine tasks and enabling them to focus more on strategic activities (Mehta, 2025; Alshahrani et al., 2025). Besides, the HR managers commonly consider the concept

of AI as a positive element of efficiency and time savings spent on routine tasks like data input, scheduling, and reporting, which is one of the most recognized practical advantages of AI adoption in HRM (Alshahrani et al., 2025). Moreover, it is also demonstrated in the literature that AI integration can be effective in terms of making corporate decisions and processes more effective, as AI products offer predictive data and operational dashboards, which allow making HR decisions faster and more accurate.

Overall, both theoretical, empirical, and systematic research findings strongly agree with the beneficial effect of using AI applications on the efficiency of HR processes. The operational workflow is improved with the help of AI technologies, data-driven HR can be made, and time spent on manual processing can be decreased in major HR functions, which forms the basis of Hypothesis 2.

H2: *The implementation of AI Applications in HRM has a significant positive impact on HR Process Efficiency.*

2.7.3. AI Applications in HRM and HR Process Efficiency

The academic research on human resource management always demonstrates that the core HR functions like recruitment and selection, performance appraisal, and training and development have a profound impact on organizational and HR performance, like efficiency of HR processes, organizational employee performance, and the general effectiveness of operations. It is established that recruitment and selection processes are core organizational performance practices as they define the quality of human capital joining the organization. Properly conducted and planned recruitment practices positively affect the quality of the workforce, minimising mis-hires and turnover, and ultimately optimise HR practices and lower administrative expenses on the process of recruitment, which is challenging with a high turnover rate caused by mis-hiring (Mwambela & Bwacha, 2025). The findings indicate that effective recruitment practice will not only get competent employees but also help more effective HR processes by reducing re-work and duplication in HR processes.

It has also been demonstrated that performance appraisal practices are very important in ensuring efficiency in the HR process. Best appraisal systems ensure that the organization offers

performance feedback in real-time, and the organization establishes its performance expectations and assists managers by making decisions on promotions, rewards, and development opportunities. The literature suggests that the existence of structured and reliable appraisal systems in organizations results in enhanced accountability and less ambiguity in performance appraisals, which results into more efficient personnel decisions and improved HR processes (Hoang Dang, 2025). Performance appraisals help in making the HR processes more efficient since companies are in a better position to align employee capacity to the demands of the job hence enhancing job performance outcomes, which will continue to maintain a healthy workforce.

Another practice that is of critical relation to HR practice is training and development practices that affect the efficiency of HR processes. Training improves the flexibility of the workforce by providing an employee with relevant skills and competencies, minimizes performance errors, and contributes to the organizational capability to respond to the existing professional demands. Empirical research has shown that with organizations investing in well-designed training interventions, employees are in a better position to carry out tasks effectively, and this minimizes the variability of performance and enhances operational efficiency (Research on HR practices and organizational effectiveness, 2025). Training enhances both the technical and interpersonal capabilities of employees that are significant in the smooth running of work processes and the decreased supervisory control.

Taken together, these studies suggest that HR practices implementation does not only enhance employee performance but also has a direct influence on the efficiency of the HR processes themselves. As an illustration, effective recruitment saves time-to-fill, increases the candidate-job fit, and makes the onboarding process easier, thereby making the overall HR operations more efficient. The opinions about performance would be timely, and structured performance appraisals would supply performance data immediately, allowing prompt decision-making and eliminating inefficiencies that could arise due to ambiguous appraisals. On the same note, specialized training also minimizes process errors, increasing functionality, and advancing better performance even within the organizational units.

In addition, meta-analyses and evidence reviews support the impact of HR practices on numerous organizational performance indices such as adaptability, creativity, and employee

commitment, which are the foundations of effective HR processes (CIPD, 2025). These results can be understood as an indication of the cohesiveness of bundles of HR practices to build upon positive HR outcomes with an implicit positive effect on the efficiency of HR processes, as seen in the way of better employee performance, retention, and engagement.

To sum up, the available literature has been consistently supporting the research hypothesis that HR processes, including the recruitment and selection process, performance appraisal process, and training and development process, have a direct and significant positive impact on the HR processes efficiency. Such practices enhance the capacity of the workforce, the quality of decisions, and the efficiency of HR processes in drilling out inefficiencies in the HR processes, and, indeed, Hypothesis 3 is confirmed.

H3: *HR Practices (Recruitment, Appraisal, and Training) directly and significantly influence HR Process Efficiency.*

2.7.4. AI Applications in HRM, HR Practices, and HR Process Efficiency

The idea that Artificial Intelligence (AI) applications mediate the relationship between traditional organizational HR practices and HR process efficiency has been in circulation among contemporary organizational studies, which makes sense given the stronger focus on how technology not only sustains outcomes of HR functions but also alters them. It means that it is the HR practices that drive the adoption of AI that subsequently affects the efficiency of HR processes, and not the other way around, where the HR practices have their effects on the efficiency. This view is anchored on socio-technical systems that regard technology and human processes as operative components of organizational systems. Research in digital transformation posits that AI can be used as a tool that can be able to transform HR investments (including recruitment, appraisal, and training practices) into effective output in terms of improving the quality of decisions, automating workflows, and responsiveness to workforce needs (Nawaz et al., 2024; Rasheed et al., 2025; Ubeda-Garcia et al., 2025).

Although the mediating role of AI is still in its early stages, empirical evidence of the role is being observed in the literature in the HRM and digitalization fields. As an illustration, the body of literature in digital workplace transformation has concluded that HR practices that are consistent

with the technological adoption models have a significant impact on organizational performance that can be mediated by redesigning HR processes, training employees to use new technologies, and digital competency. (Rubab, 2025). Here, AI acts as a mediating variable, which amplifies the performance of HR practices on outcomes by improving the capacity of HR systems to manage complexity and provide timely and correct insights, which is a fundamental necessity to HR process efficiency. This is consistent with digital transformation studies that indicate that investment in HR practices (e.g., targeted training and performance systems) enhances results in most instances that is mediated by technology-enabled systems (Rubab, 2025).

Additionally, the conceptual studies on the incorporation of AI in HRM emphasize the role of the AI tools in enhancing the performance of conventional HR practices. An example is the use of AI in recruitment, such as to screen and match fit applicants, allowing human resource departments to handle large applicant pools more effectively and precisely than traditional human-only applications, effectively mediating the effects of structured recruitment practice on efficiency outcomes. Equally, the AI-supported performance appraisal systems improve the reliability and validity of performance appraisal as they present data-driven insights, which reinforce the connection between performance management procedures and efficiency of the processes. In combination with AI-based personalized learning platforms, training and development enhance the acquisition of skills and reduce redundancy in training, providing an example of how technology operationalizes quality HR practices to generate efficient HR process results (Rubab, 2025; Nawaz et al., 2024).

Although there is little direct empirical research on the use of AI to mediate between HR practices and HR process efficiency, there are a number of other related studies that support this conceptual channel. As an illustration, a study on the use of AI in HRM concludes that the adoption of AI mediates the correlation between organizational readiness variables and efficient HR outcomes, which means that AI is a necessary mediator to transfer strategic inputs into quantifiable benefits (Goswami et al., 2023; Nawaz et al., 2024). It was observed that in the Indian pharmaceutical industry, the introduction of AI acted as an intermediary between organizational issues and successful HRM strategies had a trend, which reinforces the hypothesis that technology can be used as a mediator between the management practice and performance results in areas of HR. The type of mediated relationship allows underscoring the idea that AI does not merely

complement HR practices, but is an essential process, as a result of which an improvement in practices contributes to efficiency (Goswami et al., 2023).

Besides that, studies investigating the potential of organizational learning and technological trust as mediators between AI adoption and organizational effectiveness show the importance of technology-related mechanisms playing the role of intermediaries in converting practice implementation into performance benefits (Choudhary et al., 2026). This study is based on the concept of organizational learning capability and technological trust although it does not discuss AI as such, nevertheless, it contributes to the overall theoretical concept that intermediate constructs are central to the understanding of the impacts of technology on HR and organizational performance, which implies that AI mediates between initial HR practices and efficiency outcomes (Choudhary et al., 2026).

In such a way, despite the fact that direct empirical mediation research on AI among HR practices and HR process efficiency has not yet been carried out, the literature continues to support the idea of AI being one of the key mechanisms that increases the impact of HR practices on efficiency outcomes. The AI applications aim at mediating the connection between well-designed HR practices and enhanced HR process performance, which supports Hypothesis 4: through automation and predictions, as well as more personalized and responsive HR functions, AI applications can facilitate better HR practice execution and better HR process performance.

H4: *AI Applications in HRM significantly mediate the relationship between HR Practices and HR Process Efficiency.*

CHAPTER 3: RESEARCH METHODOLOGY

3.1. Type of Research

The study will use a quantitative and explanatory research design to test the suggested relations between organizational HR practices, AI usage in HRM, and HR process efficiency in an empirical way. The quantitative method is suitable since the hypotheses of the research (H1-H4) are to test the hypothesized relationships and measure the latent variables in terms of structured scales based on the previously tested instruments (Parayitam et al., 2021; Ramy, 2025). The study is cross-sectional, as it records the data at one point in time, which will enable the test of the direct and mediating influences of the AI application in HRM on the relation between the HR practices and efficiency of HR processes. This methodology is based on a positivist epistemological standpoint that expects observable and measurable constructs to be tested systematically with the help of statistical analysis.

3.2. Target Population

The research target population is employees of the IT, technology and digitally driven organizations in Pakistan who are directly involved with or affected by human resource functions of recruitment and selection, performance appraisal and training and development. These workers are HR specialists, managers, team leads, and operational workers who have been exposed to the HR practices and, in particular, AI-capable applications in the recruitment, performance appraisal, or training provision. IT and technology organisations were selected on the basis of being more prone to adopting AI applications in HRM than traditional industries; therefore, they are more likely to generate significant variance in AI application and HR processes outcomes. The respondents were expected to have a minimum of one year of organizational experience, thus making sure that the respondents have enough time to understand HR practices and processes in their respective current companies before they fill out the questionnaire.

3.3. Sample Size and Sampling Technique

The sampling method was a non-probability sampling which combined purposive and snowball sampling methods to find respondents who had experience in this matter. Purposive sampling was used to ensure that only those persons who had been exposed to HR practices and AI applications participated in the study whereas snowball sampling was used to expand the coverage in technology organizations through the use of referral networks. According to rules-of-thumb structural equation modelling and power assumptions, the target sample size was established as the minimum of 200 usable responses in order to guarantee sufficient statistical power to carry out PLS-SEM analysis (Hair et al., 2022). There is a 10-times rule, which shows that the size of the recommended sample must be multiple times the largest number of paths that lead to a specific construct. Nevertheless, 200 or more respondents would increase the stability of the model and reflect various organizational contexts. The selection was through contacting HR managers, LinkedIn professional networks and posting through the avenues of the internal communications to invite them to participate and attain an adequate sample coverage across the varied firm size and levels in the organization.

3.4. Data Collection Method

The self-administered structured questionnaire was used to gather data, which was sent electronically via Google Forms and Qualtrics. The questionnaire contained introductory instructions, a statement of confidentiality, as well as the demographic questions, and the substantive questions of the main constructs of the study. The method of electronic distribution was selected because it will be efficient in accessing geographically scattered respondents, and the participation will be feasible especially among IT professionals who are already used to digital platforms. The sampling process lasted six weeks after which reminders were sent after every three weeks to enhance the response. It was a voluntary participation and all respondents were made aware that there were no correct and incorrect responses but that their sincere perceptions were very important to the validity of the research.

3.5. Research Instrument

The research instrument consisted of validated scale items adapted from contemporary studies. All items were measured on five-point Likert scales ranging from 1 = Strongly Disagree to 5 = Strongly Agree. The independent variable, Organizational HR Practices, was operationalized as a higher-order construct composed of three dimensions: Recruitment and Selection 6 items, Performance Appraisal 5 items, and Training and Development 6 items. These items were adapted and refined from prior research by Demo et al. (2012) and contextualized for technology settings according to the uploaded instrument. Recruitment items assess transparency of hiring criteria and fairness, performance appraisal items measure clarity of standards and frequency of constructive feedback, while training and development items capture perceived relevance and opportunities for skill growth.

The mediator, AI Applications in HRM, was measured using items that reflect the extent of AI integration across HR functions, adapted from Ahmić (2023). Items in this section ask respondents about the use of AI for automated screening, predictive performance analysis, personalized training recommendations, and HR decision support consistent with the uploaded AI scale file and aligned with recent conceptual frameworks. Meanwhile, the dependent variable, HR Process Efficiency, was measured using items from the HR process efficiency scale, capturing respondents' perceptions of streamlined processes, reduced manual workload, improved speed and accuracy, and overall effectiveness of HR operations under AI support was adapted from Zahrani (2025).

3.6. Data Analysis Procedure

Data analysis will be performed using Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS due to its suitability for predictive research, complex models with mediators, and constructs measured with reflective indicators (Hair et al., 2022). Before hypothesis testing, the data will be screened for missing values, outliers and normality using SPSS. Descriptive statistics will be computed to understand sample demographics. For the measurement model evaluation, internal consistency reliability will be assessed using Cronbach's alpha and composite reliability, with thresholds of 0.70 or above indicating acceptable reliability. Convergent validity will be examined through average variance extracted (AVE) values above 0.50, and

discriminant validity assessed using Fornell–Larcker criteria and the Heterotrait-Monotrait (HTMT) ratio.

Once the measurement model is validated, the structural model will be tested by examining path coefficients, t-values, and p-values through bootstrapping with 5000 resamples. The hypothesized direct effects (H1–H3) will be evaluated based on the significance and direction of paths connecting HR practices, AI applications, and HR process efficiency. For the mediation hypothesis (H4), the indirect effect of HR practices on HR process efficiency via AI applications will be examined using bootstrapped confidence intervals and the variance accounted for (VAF) approach to determine partial or full mediation. Model fit indicators such as SRMR may also be reported to assess the overall adequacy of the model.

CHAPTER 4: RESULTS AND ANALYSIS

4.1. Introduction

The chapter includes the overall findings of the research in accordance with the examined data and the analysis with the help of the SmartPLS statistical program. The analysis has a structured approach; description of demographic profile of the respondents, measurement model (reliability and validity) and lastly structural model, which entails testing of the proposed hypotheses. This chapter aims at evaluating the quality of the measurements of the constructs and testing the hypothesized correlations between the HR Practices (HRP), AI Applications in HRM (AIHRM), and HR Process Efficiency (HRPE) and the role of AIHRM in mediating the relationship between HRP and HRPE.

4.2. Descriptive Statistics

The 358 respondents provide a good sample in the demographic profile: the respondents are diversified in the main characteristics. Gender-wise, 55.87% were male, and 44.13% were female with a fairly balanced sample. The highest age group was 26-35 years (38.27%), then 18-25 years (22.91%), and 36-45 years (21.79%), which indicated that most of the participants were at the early to the middle career stage. On the education level, the majority of the respondents were bachelors calculated (44.97%), master's (35.47%), some had completed a PhD (9.78%), or high school (9.78%). Regarding the work experience, 26.82% had 4-6 years, 24.3% had 1-3 years, and 20.39% had 7-10 years, meaning that there was a moderate professional exposure in the workforce. The distribution of departments was also good with Finance (22.91%), Marketing (21.51%), Operations (20.11%), HR (19.55%), and IT (15.92) giving a balanced presentation of the various organizational functions.

Table 1 Descriptive Statistics Profile of Respondent (n=358)

Demographic	Category	Frequency	Percentage
Gender	Male	200	55.87
	Female	158	44.13
Age Group	26-35	137	38.27
	18-25	82	22.91
	36-45	78	21.79
	46-55	37	10.34
	56+	24	6.7
Education Level	Bachelor	161	44.97
	Master	127	35.47
	PhD	35	9.78
	High School	35	9.78
Experience	4-6 years	96	26.82
	1-3 years	87	24.3
	7-10 years	73	20.39
	10+ years	64	17.88
	<1 year	38	10.61
Department	Finance	82	22.91
	Marketing	77	21.51
	Operations	72	20.11
	HR	70	19.55
	IT	57	15.92
Total		358	100

4.3. Reliability Analysis

The constructs were tested in terms of reliability through Cronbach's Alpha, Composite Reliability (CR) and Average Variance Extracted (AVE). The findings suggest great internal consistency. The Cronbach's alpha of HR Practices was very high of 0.965 and CR of 0.966, which is well above the conventional acceptable level of 0.70. Likewise, AI Applications in HRM were also very reliable with alpha of 0.914 and CR of 0.916. Acceptable reliability was also exhibited by HR Process Efficiency (a = 0.881, CR = 0.881). As far as convergent validity is concerned, all constructs reported AVE values that exceeded the minimum required level of 0.50 where HR Process Efficiency (0.737), then HR Practices (0.645), and AIHRM (0.624) are ranked. These findings prove the reliability and validity of the model of the measurement to be further analyzed.

Table 2 Reliability Analysis

	Cronbach's Alpha	**Composite Reliability (rho_a)**	**Average Variance Extracted (AVE)**
AI Applications in HRM	0.914	0.916	0.624
HR Practices	0.965	0.966	0.645
HR Process Efficiency	0.881	0.881	0.737

4.4. Discriminant Validity

4.4.1. Heterotrait-Monotrait Ratio (HTMT)

The Heterotrait-Monotrait (HTMT) ratio was used to evaluate the discriminant validity, which is a strong criterion recommended by Henseler et al. (2015). The HTMT values were below the conservative of 0.85, which proves that the constructs are statistically different. In particular, the HR Practices vs AI Applications in HRM HTMT was 0.672, and HR Practices vs HR Process Efficiency the lowest of all pairs was 0.433. The value of the HTMT between AI Applications in

HRM and HR Process Efficiency was 0.747. These findings support the conclusion that discriminant validity is achieved, meaning that each of the constructs measures a distinct dimension of the overall model.

Table 3 Discriminant Validity: Heterotrait-Monotrait Ratio (HTMT)

HR Practices <-> AI Applications in HRM	0.672
HR Process Efficiency <-> AI Applications in HRM	0.747
HR Process Efficiency <-> HR Practices	0.433

4.5. Outer Loadings (Factor Loadings)

To determine the reliability of the indicators, the factor loadings of the single indicators on their own constructs were analyzed. In the case of AI Applications in HRM, all the items had loadings at the recommended level of 0.70 with the highest 0.829 (AIHRM8) to the lowest 0.727 (AIHRM2). Likewise, HR Process Efficiency items were loaded with very high values 0.834(HRPE1) to 0.872(HRPE3), indicating a strong measure of quality. On the HR Practices construct, there were also sub dimensions like Recruitment and Selection (RSP), Training and Development (TDE) and Competency-Based Performance Appraisal (CBPA) which had satisfactory outer loadings. The values of RSP item loadings were between 0.761 and 0.853; TDE; between 0.733 and 0.818 and CBPA; between 0.749 and 0.849. Such findings confirm the power of individual indicators and justify the convergent validity of each of the constructs.

Table 4 Factor Loadings (Outer Loadings)

AI Applications in HRM	AIHRM1	0.802
	AIHRM2	0.727
	AIHRM3	0.775
	AIHRM4	0.772
	AIHRM5	0.823
	AIHRM6	0.800
	AIHRM7	0.783
	AIHRM8	0.829
HR Process Efficiency	HRPE1	0.834
	HRPE2	0.869
	HRPE3	0.872
	HRPE4	0.858
HR Practices (Recruitment & Selection)	RSP1	0.761
	RSP2	0.827
	RSP3	0.778
	RSP4	0.851
	RSP5	0.853
	RSP6	0.791
HR Practices (Training & Development)	TDE1	0.813
	TDE2	0.798
	TDE3	0.818
	TDE4	0.733
	TDE5	0.786
	TDE6	0.783
HR Practices (Performance Appraisal)	CBPA1	0.836
	CBPA2	0.824
	CBPA3	0.794
	CBPA4	0.749
	CBPA5	0.849

4.6. Hypothesis Testing (Direct and Indirect Effects)

The path coefficients (b), standard errors, t -statistics, and p-values were used to test hypotheses. The level of support of all the hypothesized relationships was statistically significant ($p < 0.001$). The direct effect of HR Practices on HR Process Efficiency H1 had a significant positive effect ($b = 0.426$, $t = 14.443$). The H2, HR Practices to AI Applications in HRM was also influential ($b = 0.635$, $t = 21.211$), meaning that the stronger the HR practices, the more the adoption of AI in HR. The strongest effect ($b = 0.671$, $t = 22.739$) was H3; the direct effect of AI Applications in HRM on the efficacy of HR Process, which confirmed that the introduction of AI positively affects the results of HR activity. Lastly, the statistically significant coefficient ($b = 0.426$, $t = 14.443$) was also found between H4, which was the indirect effect of HR Practices on HR Process Efficiency through AI Applications in HRM. This confirms the mediating nature of the AI applications between the HR practices and process efficiency.

Table 5 Summary of Hypothesis Testing

Paths	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
AIAHRM -> HRPE	0.671	0.672	0.030	22.739	0.000
HRP -> AIAHRM	0.635	0.637	0.030	21.211	0.000
HRP -> HRPE	0.426	0.428	0.029	14.443	0.000
HRP -> AIAHRM -> HRPE	0.426	0.428	0.029	14.443	0.000

4.7. Measurement Model:

The measurement model is used to evaluate the reliability and validity of the latent constructs: HR Practices, AI Applications in HRM, and HR Process Efficiency. Three important criteria are discussed within this model: indicator reliability (outer loadings), internal consistency reliability (Cronbach's alpha and composite reliability) and convergent validity (Average Variance Extracted - AVE). All loading of indicators is above the minimum acceptable level of 0.70, which is a high level of item reliability. In the case of HR Practices, the outer loadings are between 0.733 (RSP6) and 0.853 (RSP3), an affirmation that all the items are strong indicators of the underlying construct. In the same case, indicator loadings of AIHRM Applications, the highest loading of the score is AIHRM2 (0.727) and AIHRM8 (0.829), indicating good reliability among all items. Finally, the indicators of HR Process Efficiency also have strong loadings 0.834 (HRPE1) to 0.872 (HRPE3), which enhances the reliability of the measurement model further. The p-values = 0.000 is statistically significant to all the outer loadings, which means that all the items are significantly contributing to their corresponding constructs. This augers well with the structural strength of the model.

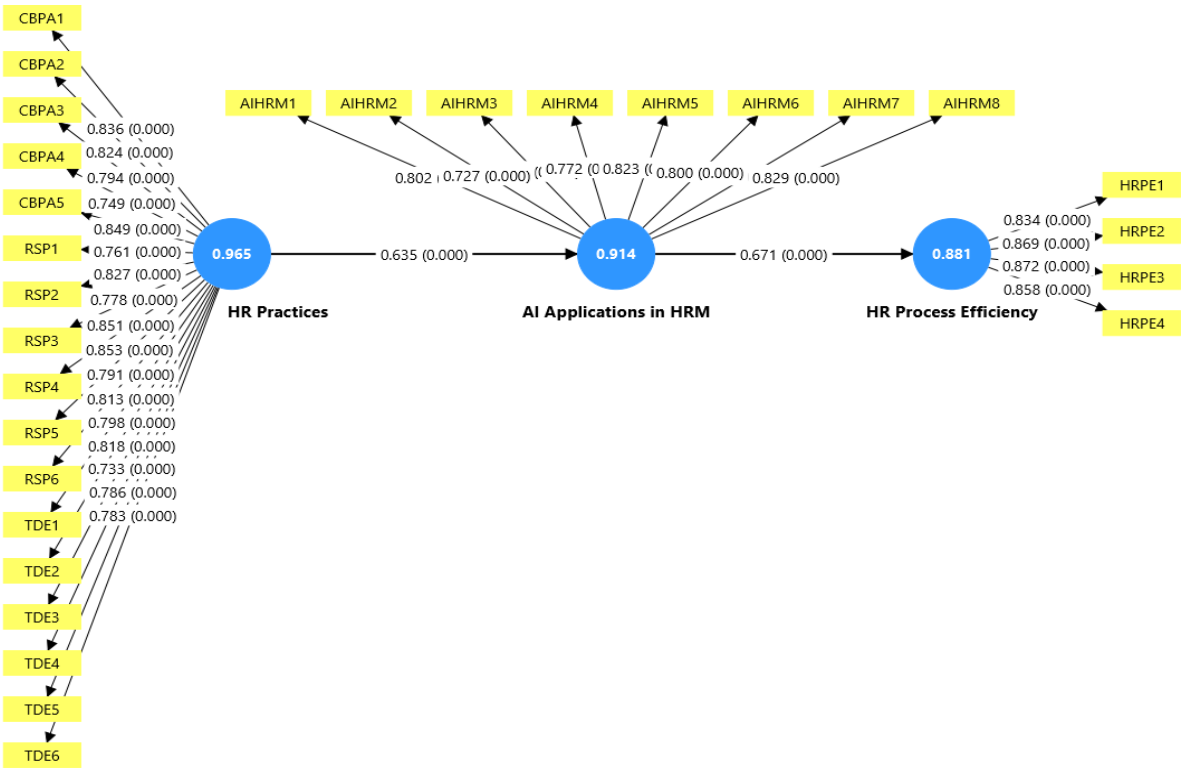

Figure-2 Measurement Model

4.8. Chapter Summary

The current chapter examined the results of the data gathered with the help of the survey instrument through PLS-SEM. The assessment using the measurement model proved that the data met the criteria of reliability and validity. The structural model discussion showed that AI applications in the HRM improvements are profoundly affected by HR practices, which also boost the efficiency of the HR processes. Moreover, it was also discovered that AIHRM played an important role in the model as a mediator. The hypotheses were statistically significant, which is a solid basis in the discussion and implications made in the following chapter.

CHAPTER 5: DISCUSSION AND CONCLUSION

5.1. Introduction

This chapter provides the interpretation of the findings described in Chapter 4 in the context of the existing literature, theory, and the study hypotheses. The following objectives guided the study (a) to investigate the relationship between the organization HR practices with the adoption of AI applications in the HRM, (b) to test the impact of AI application on the efficiency of HR processes, (c) to test the direct relationship between HR practices and HR process efficiency, and (d) to test whether AI applications mediate the relationship between HR practices and HR process efficiency. The findings revealed that the positive relationships were significant in all paths that were hypothesized, although the impacts of AI adoption on HR process efficiency were strong, and AI applications significantly mediated between the two. These findings are interpreted in this discussion based on the available research background with references to their similarities, differences, and theoretical implications.

5.2. Discussion

The results showed that there was a strong and positive correlation between the organizational HR practices (recruitment and selection, performance appraisal, and training) and the implementation of AI applications in HRM, which supported Hypothesis 1. It is in line with the past studies that indicated that organisations whose HR functions have been developed are more likely to deploy digital technologies to facilitate and improve daily HR procedures (Nawaz et al., 2024). The authors discovered that companies that have invested in systematic recruitment, performance appraisal, and training frameworks are more willing and eager to adopt AI-based tools, as they enhance the efficacy of the current practices. Likewise, the Pakistani case study by Ahmed (2024) revealed that organizations whose HR practices were well organized are more inclined to incorporate AI tools throughout their recruitment and performance systems, and this study implies that there is an organizational fit of the HR strategy with the adoption of AI. Another aspect Ubeda-Garcia et al. (2025) identify is the fact that AI is most frequently used in companies with strategic and structured core HR practices, and thus, it suggests that well-established HR systems offer a favorable platform upon which technological innovation can be implemented. The

favorable association in the present study might also indicate the growing awareness of the strategic importance of AI. HR departments that already focus on competency-based hiring, ongoing feedback on appraisals, and focused training are already more likely to view AI as a logical addition and continuation of what exists, as opposed to a disruptive one. Such understanding correlates with the position that the use of AI is not just technological diffusion, but one of the strategic reactions in increasing the power of HRM (Thakur, 2025). All these results taken together indicate that HR practices do not work in vacuums but affect organizational readiness, resource distribution, and managerial determination to use advanced HR technologies. The present research builds on the work of Rawashdeh et al. (2024), who discovered that e-HRM practices also lead to better performance outcomes and demonstrate that the adopted HR systems also encourage using AI applications.

Hypothesis 2 was that the data on the implementation of AI applications in HRM has a positive influence on the efficiency of HR processes, and the data substantiated this hypothesis. This finding is consistent with an emerging literature that AI technologies automate the HR processes, decrease the time of their cycles, and assist in making decisions with higher accuracy (Murugesan, 2023). An empirical experiment conducted by Murugesan recorded that AI-driven HR processes, including automated screening, predictive and performance analysis, and personalized learning systems, contribute to high-speed operation and decreased manual labor directly with efficiency outcomes of HR activities reported in this study. Nawaz et al. (2024) also demonstrated that the adoption of AI enhances HR operational measures by automating and combining information. They indicate that, in the case of systematic integration of AI tools into HRM, the organizations demonstrate the tangible benefits related to the process efficiency not only in terms of speed, precision, and employee satisfaction. This is also echoed in the work of Venugipal (2024); companies that implement AI in their talent acquisition and decision support processes will be more HR agile, which leads to lower levels of redundancy and an improved distribution of HR resources. This study establishes that, besides being a technological upgrade, AI adoption is also an operational boost that will change the HR activities into administrative duties but strategic, data-driven practices. Comprehensively, the significant impact of AIHRM on HRPE in the study supports theoretical arguments that digital transformation is a necessity in modern HRM, and in line with literature that demands the redesigning of HR activities using

algorithmic and smart technologies to enhance productivity and competitive edge (Ubeda-Garcia et al., 2025).

Hypothesis 3 puts forward that a direct relationship exists between HR practices and HR process efficiency. This direct effect is supported by the data, but it is relatively weaker than the mediated one based on AI adoption. This conclusion implies that the effect of HR practices can lead to efficient outcomes, but the effect is enhanced in case of mediation with AI applications. It resembles the works by Rawashdeh et al. (2024) and other researchers in the field of e-HRM, who demonstrated that the digitalization of any HR functions positively influences the performance outcomes. Competency-based recruitment and ongoing training are HR practices that have been theorized to enhance the output of the processes through aligning the performance of employees to the needs of an organization and minimizing waste of processes (Abu Alhaija and Alkshali, 2024). Efficient recruitment, appraisal, and training help in streamlining HR operations, minimizing reworking, and shortening onboarding periods by developing a stronger workforce and enhancing their performance levels and standards. Nevertheless, the direct impact is lower than the mediated impact which indicates that the HR practices have the greatest impact when enhanced by technological integration. In other words, the HR systems may be core, yet their performance in terms of efficiency is strongly boosted by integrating AI applications a finding that both reinforces the traditional HRM theory and the new digital HRM insights.

Hypothesis 4 claimed that AI applications mediate the association between HR practices and HR process efficiency and it was supported by the empirical evidence. This mediated pattern is aligned with the idea of conceptual frameworks in the literature, which propose that AI is utilized as a mechanism, which converts HR investments into efficiency gains (Thakur, 2025). Ubeda-Garcia et al. (2025) suggest that AI can help address the gap between the conventional HR systems and performance through real-time analytics and automation, as well as decision support features. Rasheed et al. (2025) also note that AI facilitates the execution of HR practices, which take place more precisely and faster, which may imply that AI is seen as a process enabler, but not a supportive tool. This confirms the fact in your data that the practices of the HR result in more efficiency majorly when AI technologies are used. The mediating model combines the older HRM theories and digital HRM insights by proving that the contribution to the HR results is jointly done by structural HR practices and technological capabilities. It builds on the results of Rawashdeh et

al. (2024) on the advantages of e-HRM by clarifying that AI, which is a more advanced type of digital HRM, is chief in generating efficiency benefits.

5.3. Conclusion

The results of this paper are strong empirical data to support the following statement: organizational HR practices largely determine AI adoption in HRM, where AI adoption has a significant positive impact on HR process efficiency, and the use of AI-based applications plays a crucial mediator between HR practice and performance consequences. These findings confirm the theoretical framework and emphasise the synergy between HR systems and technology in the modern organizational environment. This study, by showing the direct and mediated relationships, adds to the collective comprehension of HRM and digital technologies in their interrelation and the mutual effectiveness of the two concepts in promoting human capital performances.

5.4. Practical and Managerial Implications

To begin with, the HR managers must understand that even structured HR practices will help to improve the outcomes of HR processes, but their effectiveness will be much greater in case they are supported with the help of AI technologies. This implies that there needs to be a robust underpinning HR machinery to ensure that the gains of efficiency are maximized in case of investment in AI tools. Second, organisations need to focus on digital preparedness and train HR professionals to use AI opportunities constructively. Since the adoption of AI moderates the relationship between HR practices and efficiency, HR teams need to be prepared with the skills and knowledge to interpret the AI outputs, integrate them into the decision-making process, and address ethical issues. Third, the decision-makers ought not to perceive AI as a technological improvement but rather as a strategic facilitator of HR processes change. This means that AI efforts have to be in alignment with overall organizational objectives and incorporated into the regular business processes such as recruitment, appraisal, and learning systems to make sure that the use of technology is reflected in performance levels.

5.5. Research Limitations and Future Research Direction

In spite of the contributions, there are limitations to this study. To start with, cross-sectional survey data do not allow one to draw conclusions on long-term causal relationships. Longitudinal designs would enhance causal interpretations and demonstrate the changes in AI adoption and HR practices as time goes by. Second, the sample of the research was selected among IT and technology organizations in Pakistan, and this may not be generalized to other sectors or cultures. This model should be replicated in various industries and regions in the future to determine its applicability in various organizational settings. Third, though the constructs were highly validated using the available scales, other objective performance indicators (e.g. time-to-fill, error rates) can be incorporated in future research to offset perceptual indicators of the efficiency of HR processes. Last but not the least, qualitative research examining the nature of employee and HR practitioner experience of AI integration may offer deeper insights into the process by which the statistical relationships may be explained.

5.6. Chapter Summary

This chapter presented the empirical results of the research and put them in the context of the existing literature on HRM and AI. All hypothesized relationships were found to be supported: (a) HR practices predict adoption of AI; (b) adoption of AI has a significant positive influence on HR processes; (c) the HR practices directly influence efficiency, and (d) it is through AI applications that the effect of HR practices on efficiency is carried out. Practical implications, restrictions of research, and future directions were also provided, which outlined a way forward in terms of researchers and practitioners in order to enhance the effectiveness of HRM in digital organizations.

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APPENDIX

RESEARCH QUESTIONNAIRE

I am a student of the Bahria University Islamabad campus, and as a part of my MBA curriculum, I am conducting research on the topic "Impact of HR Practices on HR Efficiency with a Mediating Effect of Artificial Intelligence: A study of the IT sector of Pakistan." The collected data in the IT sector will be used only for academic purposes. The data collected shall not be disclosed to any unauthorized person. Kindly answer the following questions; your cooperation will be highly appreciated.

Respondent Profile

Gender:	☐ Male	☐ Female			
Age:	☐ <20	☐ 21–30	☐ 31–40	☐ 41–50	☐ >50
Qualification:	☐ UG	☐ Graduate	☐ Master's	☐ PhD	
Years of Experience:	☐ 0–1	☐ 1–3	☐ 3–6	☐ 6–9	☐ >10

Job Title:

☐ Manager/Supervisor

☐ Human Resource Officer

☐ Software Engineer

☐ Software Developer

☐ Data Analyst

☐ Technical Lead / Team Lead

☐ Administrative Staff

☐ IT Support

☐ Other: _____

Please tick the box that best describes your level of agreement with each statement: (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

No.	Statement	1	2	3	4	5
HR Practices						
I. Recruitment and Selection Processes						

1	My organization widely disseminates information about both external and internal recruitment processes.	☐	☐	☐	☐	☐
2	My organization discloses information to applicants regarding the steps and criteria of the selection process.	☐	☐	☐	☐	☐
3	My organization communicates performance results to candidates at the end of the selection process.	☐	☐	☐	☐	☐
4	Selection tests in my organization are conducted by trained and impartial people.	☐	☐	☐	☐	☐
5	My organization has competitive selection processes that attract competent people.	☐	☐	☐	☐	☐
6	My organization uses various selection instruments (e.g., interviews, tests, etc.).	☐	☐	☐	☐	☐
II. Training, Development & Education						
7	I am able to use the knowledge and behaviors learned in training sessions at my daily work.	☐	☐	☐	☐	☐
8	My organization helps me develop the skills I need for the successful accomplishment of my duties.	☐	☐	☐	☐	☐
9	My organization invests in my development and education (e.g., full or partial sponsorship of degrees or courses).	☐	☐	☐	☐	☐
10	In my organization, training programs are evaluated by the participants.	☐	☐	☐	☐	☐
11	My organization actively stimulates learning and the application of new knowledge.	☐	☐	☐	☐	☐
12	Training needs are identified periodically within my organization.	☐	☐	☐	☐	☐
III. Competency-Based Performance Appraisal						
13	My organization discusses competency-based appraisal criteria and results with its employees.	☐	☐	☐	☐	☐

14	Competency-based performance appraisal provides the basis for an employee development plan.	☐	☐	☐	☐	☐
15	Performance appraisals are the basis for decisions about promotions and salary increases.	☐	☐	☐	☐	☐
16	My organization disseminates competency-based appraisal criteria and results to its employees.	☐	☐	☐	☐	☐
17	My organization periodically conducts competency-based performance appraisals.	☐	☐	☐	☐	☐
AI Application HRM						
1.	AI is effectively utilized in **HR planning and strategic** decision-making.	☐	☐	☐	☐	☐
2.	The use of AI has significantly improved our **HR recruitment** processes.	☐	☐	☐	☐	☐
3.	AI tools have enhanced the accuracy and fairness of **HR selection**.	☐	☐	☐	☐	☐
4.	**HR onboarding** is more efficient and engaging through AI-driven automation.	☐	☐	☐	☐	☐
5.	AI applications have optimized our **HR training and development** programs.	☐	☐	☐	☐	☐
6.	**HR performance management** is more objective when supported by AI.	☐	☐	☐	☐	☐
7.	AI systems effectively manage **HR compensation and benefits** administration.	☐	☐	☐	☐	☐
8.	**Talent management** (identification and retention) is improved by AI insights.	☐	☐	☐	☐	☐
HR Process Efficiency (HRPE)						
1.	AI has streamlined key HR processes.	☐	☐	☐	☐	☐
2.	AI reduces manual workload in HR tasks.	☐	☐	☐	☐	☐

3.	AI minimizes errors in HR operations.	☐	☐	☐	☐	☐
4.	AI improves HR process speed and accuracy.	☐	☐	☐	☐	☐